AMENDMENT TO THE SPECIFICATION

Please amend the Title beginning on page 1, line 1 and ending on page 1, line 2 to read as follows:

~~PERPENDICULAR READ/WRITE HEAD FOR USE IN A DISC DRIVE STORAGE SYSTEM~~A HEAD INCLUDING A PERPENDICULAR WRITING ELEMENT HAVING A RETURN POLE LOCATED DOWNSTREAM OF A MAIN POLE RELATIVE TO A ROTATING RECORDING MEDIUM

Please replace the paragraph beginning on page 5, line 17 and ending on page 6, line 6 with the following paragraph:

FIG. 1 is a top view of a disc drive 100, with which embodiments of the present invention may be used. Disc drive 100 includes a magnetic disc 102 mounted for rotational movement about an axis 104 and driven by a spindle motor (not shown). The components of disc drive 100 are contained within a housing that includes a base 106 and a cover (not shown). Disc drive 100 also includes an actuator 108 mounted to a base plate 110 and pivotally moveable relative to disc ~~104~~ 102 about an axis 112. Actuator mechanism 108, includes an actuator arm 114 and a suspension assembly 116. A slider 118 is coupled to suspension assembly 116 through a gimbaled attachment which allows slider 118 to pitch and roll as it rides on an air bearing above a surface 120 of disc 102. Actuator mechanism 108 is adapted to rotate slider 118 on an arcuate path 122 between an inner diameter 124 and an outer diameter 126 of disc 102. A cover 128 can cover a portion of actuator mechanism 108. Slider 118 supports a head 130 at a trailing portion. Head 130 includes separate perpendicular reading and write elements for reading data from, and recording data to disc 102.

Please replace the paragraph beginning on page 8, line 13 and ending on page 8, line 25 with the following paragraph:

Main pole tip 154 is shaped to concentrate the magnetic flux traveling therethrough to such an extent that the orientation of magnetization in patterns 162 of storage layer 160 are forced into alignment with the writing magnetic field and, thus, cause bits of data to be recorded therein. In general, the magnetic field in storage layer 160 at main pole tip 154 must be twice the coercivity or saturation field of that layer. Disc 102 ~~Head 130~~ travels in the direction indicated by arrow 172 (FIG. ~~3~~2) relative to ~~disc 102~~ head 130 thereby positioning main pole 144 downstream of return pole 140 relative to the moving disc 102. As a result, a trailing edge 174 of main pole 144 operates as a "writing edge" that defines the transitions between bits of data recorded in recording layer 160, since the field generated at that edge is the last to define the magnetization orientation in the pattern 162.

Please replace the paragraph beginning on page 11, line 7 and ending on page 12, line 2 with the following paragraph:

Disc 102 travels in the direction indicated by arrow 201 (FIGS. 5 and 7) relative to read/write head 200. Read/write head 200 ~~travels in the direction indicated by arrow 201 relative to disc 102 and~~ includes write element 202 having a writing or main pole 204, a return pole 206, a write gap 208 separating main pole 204 and return pole 206, a back gap 210 where write and return poles 204 and 206 are connected, and a conductive coil 212. These components are formed using conventional thin film processing techniques. Writing and return poles 204 and 206 are formed of a magnetic material with high permeability and low coercivity such as cobalt-iron (CoFe), cobalt-nickel-iron

(CoNiFe), nickel-iron (NiFe), iron nitride (FeN), or other suitable magnetic material. In accordance with one embodiment of the invention, main pole 204 is formed of a soft magnetic material having a high magnetic flux density (above 1.0 T) such as CoFe, CoNiFe, $Ni_{45}Fe_{55}$, FeN, FeAlN, or other suitable material. Conductive coil 212 is positioned between writing pole 204 and return pole 206 and around back gap 210. An insulating material 214 electrically insulates conductive coil 212 from writing and return poles 204 and 206. Writing pole 204, return pole 206 and write gap 208 include writing and return pole tips 216 and 217 (FIGS. 6 and 8) that face disc 102 and form a portion of the air bearing surface at a trailing edge of the slider 118 (FIG. 1) carrying head 200. Writing and return pole tips 216 and 217 are separated by the write gap 208 having a length that is preferably less than one micrometer.

Please replace the paragraph beginning on page 12, line 3 and ending on page 12, line 16 with the following paragraph:

Writing pole tip 216 has a disc-facing surface that has a small cross-sectional area to concentrate the magnetic flux directed therethrough such that the magnetic write field exceeds the saturation field of the recording layer 160 to allow data to be recorded to disc 102 in substantially the manner discussed above. The disc facing surface of return pole tip 217 has an area that is many times greater than that of writing pole tip 216 to reduce the magnetic field in the adjacent storage layer 160 to less than a nucleation field of the storage layer 160. This is necessary since writing main pole 204 is positioned upstream of return pole 206 relative to <u>moving</u> disc 102. Because the strength of the magnetic write field in the storage layer 160 at the return pole tip 217 is lower than the nucleation field of the storage layer 160, there is very little effect by way of weakening the magnetization in any patterns 162 in the recording

medium that have been recorded by the upstream writing main pole 204.

Please replace the paragraph beginning on page 12, line 17 and ending on page 12, line 26 with the following paragraph:

Writing pole tip ~~220~~ 216 includes a trailing edge 224 and a leading edge 226. Trailing edge 224 is located in the write gap 208 and operates as the writing edge, which forms the transition between adjoining patterns 162 (FIG. 2) as discussed above. The location of writing edge 224 improves upon writing elements of the prior art due to the significantly higher write field gradient at that location than at leading edge 226. The linear density of data that can be recorded using write element 202 of the present invention is, therefore, higher than that of write elements of the prior art. Accordingly, writing element 202 can achieve higher areal density recordings than writing elements of the prior art.

Please replace the paragraph beginning on page 13, line 1 and ending on page 13, line 12 with the following paragraph:

Head 200 also includes a reading element 230 having a read sensor 232 for reading the data recorded in storage layer 160. Read sensor 232 is preferably a conventional read sensor that operates in accordance with magnetoresistive or giant magnetoresistive principles. In accordance with one embodiment of the invention, reading element 230 is positioned ~~downstream~~ upstream of writing element 202 relative to moving disc 102, as shown in FIGS. 5 and 6. Unlike prior art writing elements, the reduced size of the adjacent writing pole 204 cannot be used as a shield for read sensor 232 at the pole tip region. Instead, separate top and bottom shields 234 and 235 are used to shield

sensor 232 from external magnetic fields. Top shield 234 is separated from top main pole 204 by an non-magnetic layer 236.

Please replace the paragraph beginning on page 14, line 1 and ending on page 14, line 20 with the following paragraph:

In accordance with another embodiment of the invention, reading element 230 is positioned ~~upstream~~ downstream of writing element 202 relative to moving disc 102, as shown in FIGS. 7 and 8. This arrangement allows return pole 206 to operate as a bottom shield 235 for reading element 230. As a result, this embodiment of the invention eliminates the need for non-magnetic layer 236 and a separate bottom shield, which results in a more compact read/write head 200, process simplicity and yield increase. A further advantage to this embodiment of the invention is that the read sensor 232 can be positioned closer to disc surface 120. This is the result of being positioned closer to the trailing edge of the slider 118 (FIG. 1), which is lower than the leading edge of the slider during normal operation. This configuration is particularly advantageous for perpendicular recordings as compared to longitudinal recordings, because the fringing field generated by patterns with perpendicular magnetization 162 (FIG. 2) decays faster with the distance than the fringing field of longitudinal medium. It is therefore, desirable to position read sensor 232 as close to recording layer 160 as possible so that the small patterns with low fringing field can be accurately detected. Furthermore, the lower position of read sensor 232 allows for higher reading resolution thereby allowing read/write head 200 to operate with higher areal density recordings.

Please replace the paragraph beginning on page 15, line 22 and ending on page 16, line 2 with the following paragraph:

In accordance with another embodiment of the read/write head of the present invention, the perpendicular reading element is positioned downstream of the perpendicular writing element. In this embodiment, the perpendicular reading element includes a top shield (such as ~~235~~234) and a read sensor (such as 232) positioned between the top shield and the return pole (such as 206), which operates as a bottom shield for the read sensor.